Amendments to the Claims

1. (currently amended) A method of filtering an input data stream ~~D_{in} with a digital filter that defines a quantized impulse response to thereby generate filtered output signals of a filtered output data stream D_{out} wherein said input data stream D_{in} has~~ that provides data elements ~~samples that occur~~ at a system rate F_S, the method comprising the steps of:

converting successive strings of M successive data elements in said input data stream ~~D_{in}~~ to M parallel data elements that ~~respectively~~ occur at a substream rate F_S/M in M data substreams ~~D_{sbstrm}~~; and

at said substream rate Fs/M, generating M convolutions of ~~said~~ a quantized impulse response with said M data substreams ~~wherein each of said convolutions is arranged to generate a different one of M successive filtered output signals~~.

2. (currently amended) The method of claim 1, wherein said converting step includes the steps of:

delaying said input data stream ~~D_{in}~~ by at least one delay of $1/F_S$ to generate at least one delayed version of said input data stream ~~D_{in}~~;

and

at said substream rate F_S/M, providing corresponding data elements of said input data stream ~~D_{in}~~ and said delayed version.

3. (currently amended) The method of claim 2, wherein said delaying step includes the step of passing said input data stream ~~D_{in}~~ through at least one data register.

4. (original) The method of claim 2, wherein said providing step includes the step of latching said data elements at said substream rate F_S/M.

5. (currently amended) The method of claim 1, wherein said convolution generating step includes the steps of: ~~at said substream rate F_S/M, performing the steps of:~~

~~a)~~ delaying ~~each of~~ said M parallel data elements with delays of M/F_S to generate ~~a plurality of respective~~ delayed data elements;

~~b)~~ multiplying said delayed data elements ~~and at least one selected parallel data element~~ by selected coefficients of said quantized impulse response; and

~~c)~~ summing products generated in said multiplying step

~~; in said multiplying step, choosing said selected parallel data element and said selected coefficients to generate one of said M successive filtered output signals; and~~

~~executing M variants of said performing and choosing steps to generate all of said M successive filtered output signals~~.

6. (canceled) The method of claim 1, wherein said convolution generating step includes the steps of:

at said substream rate F_S/M, delaying each of said M parallel data elements with delays of M/F_S to generate a plurality of respective delayed data elements;

at said substream rate F_S/M, performing the steps of:

a) multiplying said delayed data elements and at least one selected parallel data element by selected coefficients of said quantized impulse response; and

b) summing products generated in said multiplying step;

in said multiplying step, choosing said selected parallel data element and said selected coefficients to generate one of said M successive filtered output signals; and

executing M variants of said performing and choosing steps to generate all of said M successive filtered output signals.

7. (canceled) The method of claim 1, further including the step of selecting, at said system rate F_S, said M filtered output signals in successive order to thereby form said filtered output data stream D_{out}.

8. (currently amended) The method of claim 1, ~~wherein said selecting step includes~~ further including the step of multiplexing said M convolutions at said system rate F_S ~~successive filtered output signals~~.

9. (original) The method of claim 1, wherein M is two.

10. (original) The method of claim 1, wherein M is at least three.

11. (currently amended) A digital filter that ~~has a quantized impulse response and that~~ filters an input data stream ~~D_{in} to thereby generate filtered output signals of a filtered output data stream D_{out} wherein said input data stream D_{in} has~~ which provides data elements ~~samples that occur~~ at a system rate F_S, the filter comprising;

a converter that converts successive strings of M successive data elements in said input data stream ~~D_{in}~~ to M parallel data elements that ~~respectively~~ occur at a substream rate F_S/M in M data substreams ~~D_{sbstrm}~~; and

a data processor ~~that performs the step of generating~~ programmed to generate, at said substream rate F_S/M, M convolutions of ~~said~~ a quantized impulse response with said M data substreams ~~wherein each of said convolutions is arranged to generate a different one of M successive filtered output signals~~.

12. (original) The filter of claim 11, wherein said converter is an M-stage buffer store.

13. (currently amended) The filter of claim 11, wherein said converter includes:

at least one register that realizes at least one delay of $1/F_S$ to generate at least one delayed version of said input data stream ~~D_{in}~~; and

latches that provide said parallel date elements from said ~~corresponding~~ data elements ~~of said input data stream D_{in}~~ and said delayed version.

14. (currently amended) The filter of claim 11, wherein ~~said convolution generating step includes the steps of:~~ to realize said convolutions at said substream rate F_S/M, said processor ~~performing the steps of~~:

~~a) delaying~~ delays each of said M parallel data elements with delays of M/F_S to generate a plurality of delayed data elements;

~~b) multiplying~~ multiplies ~~a selected one of said parallel data elements and~~ said delayed data elements by selected coefficients of said quantized impulse response to provide products; and

~~c) summing~~ sums said products ~~generated in said multiplying step;~~

~~choosing said selected parallel data element and said selected coefficients to generate one of said M filtered output signals;~~

~~and~~

~~executing M variants of said performing and said choosing steps to generate all of said M filtered output signals~~.

15. (canceled) The filter of claim 11, wherein said convolution generating step includes the steps of:

at said substream rate F_S/M, delaying each of said M parallel data elements with delays of M/F_S to generate a plurality of respective delayed data elements;

at said substream rate F_S/M, performing the steps of:

a) multiplying said delayed data elements and at least one selected parallel data element by selected coefficients of said quantized impulse response; and

b) summing products generated in said multiplying step;

in said multiplying step, choosing said selected parallel data element and said selected coefficients to generate one of said M successive filtered output signals; and

executing M variants of said performing and choosing steps to generate all of said M successive filtered output signals.

16. (currently amended) The filter of claim 11, further including a multiplexer that ~~selects,~~ multiplexes said convolutions at said system rate F_S, ~~said M filtered output signals in successive order to thereby form said filtered~~

~~output data stream D_{out}~~.

17. (original) The filter of claim 11, wherein M is two.

18. (original) The filter of claim 11, wherein M is at least three.

19. (original) The filter of claim 11, wherein said data processor includes at least one programmable signal path that is programmed to execute at least one of the M convolutions of said generating step.

20. (original) The filter of claim 11, wherein said data processor includes M fixed signal paths that are each arranged to execute a respective one of the M convolutions of said generating step.

21. (currently amended) A digital filter ~~that has a quantized impulse response and~~ that filters an input data stream ~~D_{in} to thereby generate filtered output signals of a filtered output data stream D_{out} wherein said input data stream D_{in} has~~ which provides data samples ~~that occur~~ at a system rate F_S, the filter comprising;

a converter that converts successive strings of M successive data elements in said input data stream ~~D_{in}~~ to M parallel data elements that ~~respectively~~ occur at a substream rate F_S/M in M data substreams ~~D_{sbstrm}~~; and

M convolvers which generate, at said substream rate F_S/M, M convolutions of ~~said~~ a quantized impulse response with said M data substreams ~~wherein each of said convolvers is arranged to generate a different one of M successive filtered output signals~~.

22. (currently amended) The filter of claim 21, wherein each of said convolvers includes:

delay structures that delay said M parallel data elements with delays of M/Fs to generate a plurality of delayed data elements;

multipliers that each multiply a selected one of said parallel data elements and said delayed data elements by selected coefficients of said

quantized impulse response; and

summers that sum products generated in said multipliers;

~~wherein said selected parallel data elements and said selected coefficients are chosen in each of said convolvers to generate a respective one of said M filtered output signals~~.

23. (currently amended) The filter of claim 21, wherein said convolvers include a set of delay structures that delay said M parallel data elements with delays of M/F_S to generate a plurality of delayed data elements and each of said convolvers further includes:

multipliers that each multiply a selected one of said parallel data elements and said delayed data elements by selected coefficients of said quantized impulse response; and

summers that sum products generated in said multipliers;

~~wherein said selected parallel data element and said selected coefficients are chosen in each of said convolvers to generate a respective one of said M filtered output signals~~.

24. (currently amended) The filter of claim 21, further including a multiplexer that ~~selects,~~ multiplexes said convolutions at said system rate F_S, ~~said M filtered output signals in successive order to thereby form said filtered output data stream D_{out}~~.

25. (original) The filter of claim 21, wherein M is two.

26. (original) The filter of claim 21, wherein M is at least three.